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33. ECOLOGICAL DISTRIBUTION AND POPULATION STRUCTURE OF MUD DWELLING *EDWARDSIA* (CNIDARIA: ACTINARIA) IN A MANGROVE HABITAT OF COCHIN AREA, KERALA

Mangrove areas are a characteristic coastal ecosystem in tropical and subtropical regions and the intertidal zone of this dynamic ecosystem supports a variety of animals such as molluscs, crustaceans, polychaetes and other taxonomic groups. Cochin mangroves are located along the lower part of the Cochin estuary (9° 52'-10° N and 76° 15'-76° 22' E). Most of the available information on the genus *Edwardsia* is descriptive (Athalye and Gokhale 1998), while details of the distribution pattern and population structure are scarce. The present paper describes the ecological distribution and abundance of a burrowing sea anemone *Edwardsia* sp. from the intertidal areas of the mangrove ecosystem in Guntu Island, Cochin.

A well established fringing mangrove area located in the lower reaches of the Cochin estuary was selected for the study. Mangroves are dominated by *Avicennia officinalis*, *Bruguiera* sp., *Acanthus ilicifolius* and *Clerodendrum inerme*. Less dominant and scattered species include *Acrostichum aureum* and *Rhizophora apiculata*. Sediment samples were collected at low tide from the exposed intertidal area by using a box corer (120 sq. cm area) up to 15 cm depth. Triplicate samples were made from three tidal zones — low tide, mid tide and high tide levels for two years (1989-91). Samples were pooled and sieved through a 0.5 mm mesh sieve, and the animals remaining in the sieve were collected. Sea anemones were sorted out for further study. Ecological parameters of the study area were also determined. Water characteristics, namely salinity, temperature, pH and dissolved oxygen (Strickland and Parsons 1972) and sediment characteristics, namely sand, silt and clay percentages (Krumbein and Pettijohn 1938) and organic matter concentration (Walkley and Black 1934) were estimated.

Water Characteristics: The water characteristics of the study area are given in Table 1. The most important varying ecological factor was salinity, which varied from 1.2 to 28.7 ppt. The temperature, dissolved oxygen and pH varied from 29.5 to 33.5 °C, 1.6 to 5.4 ml/l and 6.2 to 7.6 respectively.

Sediment characteristics: The sand, silt and clay contents of the substratum are given in Table 2. The entire study area, irrespective of the three tidal levels, was composed of sandy type sediment, with organic matter content varying from 0.6 to 1.53%.

Population density: The population density of *Edwardsia* sp. is given in Table 1. Total density was higher (364/0.1 sq. m) in the high tide zone, followed by mid tide zone (275/0.1 sq. m) and low tide zone (11/0.1 sq. m). The monsoon (June-September) and post-monsoon (October-January) periods showed the highest population density.

The occurrence of the mud dwelling, burrowing sea anemone *Edwardsia* was earlier

TABLE 1

MONTHLY POPULATION DENSITY /0.1 SQ. M OF *EDWARSIA* SP. AND WATER CHARACTERISTICS IN THE STUDY AREA

Year	1989								1990									1991				
Month	Sep	Oct	Nov	Jan	Feb	Mar	May	Jun	Jul	Aug	Sep	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
High tide zone	25	20	8	28	8	36	20	-	34	42	120	8	6	-	-	-	6	3	-	-	-	
Mid tide zone	-	14	22	-	6	-	6	-	6	20	25	145	8	6	14	3	-	-	-	-	-	
Low tide zone	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	
Temperature (°C)	ND	ND	ND	31.5	31	29.5	32	31.5	30	30.5	30.5	31	30.5	30.5	32	33	33.5	33.5	31	30	31	
Salinity (ppt)	1.5	7.3	15.2	19.1	28.7	21.3	18.8	1.2	1.2	0.6	13.1	17	18.2	24.9	19.9	17.4	19	20.2	1.8	1.9	1.3	
Oxygen (ml/l)	2.4	1.8	2.5	3.6	3.9	2.4	2.9	3.2	3.4	2.7	1.6	2.8	3.9	3.5	3.7	1.6	1.9	2.6	4.2	3.2	5.4	
pH	ND	ND	ND	ND	ND	7	6.9	7.2	7.2	7.1	7	6.9	6.7	6.2	6.9	7	6.9	7.2	7.5	6.9	7.6	

ND = Not determined

TABLE 2
SEDIMENTS CHARACTERISTICS OF THE STUDY AREA
(ALL VALUES ARE IN %)

Tidal Zone	Sand	Silt	Clay	Organic Matter
	March 1990			
High tide zone	87.22	10.38	2.40	1.33
Mid tide zone	88.76	7.62	3.62	0.76
Low tide zone	86.34	5.19	8.47	0.72
	September 1990			
High tide zone	85.86	4.97	9.17	0.78
Mid tide zone	80.92	11.38	7.70	0.95
Low tide zone	85.69	11.56	2.75	0.60
	January 1991			
High tide zone	88.76	3.31	7.93	1.53
Mid tide zone	77.24	2.66	20.10	1.40
Low tide zone	79.67	9.02	11.31	1.10

reported from mangrove soil habitat (Nandi and Choudhury 1983, Athalye and Gokhale 1998) and non-mangrove (Parulekar1968, England 1989) areas within India. None of these studies described the ecological distribution and population structure in detail.

The present study revealed that, in general, the pre-monsoon period (February-May) had the lowest population of sea anemone compared to monsoon and post-monsoon periods. There was striking variation in the population density throughout the study period. The substantial fluctuation in salinity did not affect the population structure of *Edwardsia* sp., which suggests its euryhaline nature.

The sea anemone showed maximum population density in the high tide level area compared to the mid and low tide level areas of the intertidal zone. The low tide zone seems to be unfavourable for the occurrence of sea anemones. This variation in the population density may be related to the tidal inundation process and the nature of the substratum. The high tide zone was exposed all the time, except during high tide, while the low tide zone was almost submerged irrespective of the tidal rhythm. The mid tide zone is exposed to a medium extent. The texture of the sediment was more or less similar, sandy type mixed with mangrove detritus, in all the tidal zones. The slightly more consolidated and water-free substratum of the maximum exposed area of the high tide zone, followed by the mid tide zone, appears to be favourable for the occurrence and burrowing of *Edwardsia* sp. These zones may also provide more suitable ecological niches than the waterlogged sediment of the low tide zone.

The high abundance and occurrence of sea anemone in the high tide zone is due to the adaptations of the species to flooding and desiccation, which enables it to overcome the peculiar environmental changes (i.e the ability to tolerate salinity changes and behavioural and physiological responses, especially respiratory adaptation during the periodic exposure of the area in connection to the tidal cycle) of the intertidal area and thrive there.

Literature survey revealed that the occurrence of *Edwardsia* sp. in Cochin mangroves is a new record for Kerala.

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34. FIRST RECORD OF A CILIOPHORAN *TRICHODINA DOMERGUEI* F. *MAGNA* LOM, 1960 FROM FRESHWATER FISH *PSEUDOAPOCRYPTUS LANCEOLATUS* (BLOCH AND SCHNEIDER) FROM INDIA

(*With one plate and one text-figure*)

Trichodina domerguei f. *acuta* f. n. was found by Lom on the body surface (skin, fins and occasionally gills) of *Cyprinus carpio*, *Perca fluviatialis*, *Lucioperca lucioperca*, *Leucaspis delineatus*, *Rhodeus sericen*. On the skin of tadpoles of several species of frogs, it was identified as *Trichodina domerguei* f. *latispina* Dogel, 1940. The freshwater fish *Pseudoapocryptus lanceolatus* (Family Gobidae) were examined from September, 1999 to January, 2000 for ciliophoran parasites, and the host fish was found to be infested with a European trichodinid *Trichodina domergueri* f. *magna* Lom, 1960.

Trichodinid ciliophorans are known to be dangerous ectoparasites of fishes, causing damage to the gills. In highest degree of infestation, hypersecretion of mucus occurs. In spite of this, erosion of proliferation of the branchial epithelium and occasional haemorrhage occurs. We confirm the existence of an introduced European trichodinid ciliophoran *Trichodina domerguei* f. *magna* Lom, 1960 in India.

Host fishes *Pseudoapocryptus lanceolatus* (Bloch and Schneider) were collected live, brought quickly to the laboratory and gill smears were made on grease-free slides. Smears containing the trichodinid ciliophorans were separated and impregnated with 2% silver nitrate solution. The impregnated slides were exposed to ultraviolet rays for about 25 minutes. Photomicrographs were taken to study morphological variation in the population of the trichodinid. Measurements are given in microns. The terminology and detailed structure of the various parts of the adhesive discs are after Lom (1958), Wellborn (1967), Arthur and Lom (1984), Vanas and Basson (1989, 1992).

Trichodina domergui* f. *magna Lom, 1960
(collected from India)
(Plate 1, Figs 1-4)

Material examined: (G/23/99) in the collection of the author. Denticle drawings and description based on Vanas and Basson (loc. cit). Blade broad. Apex rounded, parallel with border membrane. Tangent point narrow, pointed at the same level as distal surface. Anterior margin takes a sudden turn to form a notch-shaped structure, occasionally crossing Y-axis (Fig. 1d). Anterior and posterior margins not parallel. Posterior margin of the blade forming deep semilunar depression, slightly above apex. Blade connection thin and short. Central part well developed, angular, fitted tightly with preceding denticle. In most specimens, central part extends almost entirely beyond Y-axis. Ray connection broad. Rays stout, occupying the Y-axis (Fig. 1a-d). Tips of rays blunt, turned towards Y-1 axis (Fig. 1b). Central area with distinct clear portion having argentophilic granules.